4 QUALITY ASSURANCE PROJECT PLAN

Comprehensive and well defined procedures for project management, QA/QC, and documentation are instrumental in the execution of a successful field effort and the generation of high-quality data. The procedures that will be used for this investigation are described below.

4.1 Project Management

This section of the QAPP includes descriptions of the project management structure and procedures that relate to project quality assurance.

4.1.1 Project Organization

Avista will be responsible for planning and managing the tasks associated with this investigation. The work described in this SAP will be completed by Anchor Environmental, L.L.C. (Anchor). Project personnel and responsibilities are summarized in Table 4.

The chemical testing laboratory for total solids, grain size, TOC, and total PCB Aroclors analyses will likely be Columbia Analytical Services (CAS) located in Kelso, Washington. The chemical testing laboratory will conduct analyses in accordance with their quality assurance manuals. The manuals include descriptions of laboratory organization, personnel, and responsibilities; facilities and equipment; analytical methods and QA/QC protocols; and routine procedures for sample custody and data handling.

No changes in procedures specified in this QAPP, standard operating procedures (SOPs) for field and laboratory procedures, and in the laboratory quality assurance manuals will be permitted without written justification and a detailed explanation of the intended change. All changes are subject to approval by the project QA/QC coordinator and the Avista and consultant project managers. A description of any changes, with rationale, will be included in applicable quality assurance or data reports generated for this project.

4.1.2 Quality Objectives and Criteria for Measurement Data

The primary quality objective for measurement data is to obtain results that are of known and acceptable quality and are representative of the conditions present at the site. Measurement quality objectives (MQOs) have been established for this project to support this objective. Quantitative MQOs for laboratory analyses are provided in Table 5. Quantitative MQOs include precision, accuracy, and completeness. The qualitative goals of representativeness and comparability of the data are ensured by the careful collection of samples according to protocols established in the SAP (Section 3) and the use of standard methodology for testing and analyses.

To confirm that project MQOs for precision and accuracy are achieved, analytical results for field and laboratory quality control samples will be evaluated, as discussed in Section 4.3. Quality control results that do not meet target values will be qualified during data validation, and their limitations will be noted in the data quality and usability report for the project, as discussed in Section 4.3.2 of this QAPP. To ensure comparability and representativeness of the laboratory data, standard instrumentation will be used for the analyses and the instruments will be properly calibrated and maintained.

4.1.3 Special Training and Certification

Procedures to be completed for this study are, for the most part, routine. Standard procedures will be used to collect the sediment samples and to complete laboratory analyses. All field personnel will have completed the 40-hour Hazardous Waste Operations and Emergency Response training with annual refresher courses as required by the Occupational Safety and Health Administration.

4.1.4 Preventive Maintenance

Preventive maintenance procedures for this project will include routine maintenance for field equipment, scheduled equipment calibration, and having duplicate equipment available (e.g., additional batteries for field equipment) should equipment failures occur during field collection efforts.

4.1.5 Documents and Records

Procedures, observations, and test results will be documented for all sample collection, laboratory analysis and reporting, and data validation activities. Internal and external reporting procedures for this study are described in this section.

4.1.5.1 Field Records

Field records will be maintained during all stages of sample collection and preparation for shipment to the laboratory. Field records are described in Section 3.5.

In addition to the standard field records, the following reports may be completed if a deviation from the SAP or QAPP is encountered or to document an audit:

- Corrective action reports documenting any problems encountered during field activities and corrective actions taken
- System and performance audit reports completed during the investigation
- A summary of any changes made to documented procedures and the rationale for the changes

4.1.5.2 Laboratory Data Reports

The laboratory will perform data reduction as described in each test method for this project (Table 5) and submit a complete data package with full documentation for all analyses or other determinations. The laboratory's quality assurance officer is responsible for reviewing the laboratory data packages and checking data reduction prior to submittal to Anchor. The laboratory will correct any transcription or computation errors identified during their review.

The analytical laboratory will provide all information required for a complete quality assurance review, including the following:

- A cover letter discussing analytical procedures and any difficulties that were encountered
- A summary of analyte concentrations and method reporting limits with laboratory data qualifier codes appended, as appropriate

- Initial and continuing calibration data, including instrument printouts and quantification summaries for all analytes
- Results for method and calibration blanks
- Results for all QA/QC checks, including laboratory control samples (LCSs), matrix spike samples, surrogate spikes, duplicate matrix spike samples, and laboratory duplicate or triplicate samples
- Original data quantification reports for all analyses and samples
- All laboratory worksheets and standards preparation logs (data include final dilution volumes, sample sizes, wet-to-dry ratios, and spiking and standards preparation procedures for all analyses)

4.2 Data Acquisition

All field and laboratory procedures related to sample collection and analysis will be completed as described in written SOPs that are routinely used by Anchor and CAS. These SOPs will be selected and approved by the field team leader, project QA/QC coordinator, and laboratory quality assurance officer, as applicable, prior to commencement of field and laboratory activities. A general description of these procedures is provided below.

4.2.1 Field Procedures for Sample Collection

Sample collection procedures are provided in Section 3, including the following:

- Station positioning and location control
- Collection of surface sediment samples
- Collection of subsurface sediment samples
- Field documentation procedures
- Sample custody and transport procedures

4.2.2 Laboratory Procedures

Laboratory custody, sample storage, and sample analysis procedures are discussed in this section.

4.2.2.1 Laboratory Custody and Sample Storage

The laboratory project manager will verify receipt of each sample shipment and will contact the field sample manager to provide notification that all samples were

received and to relay any concerns or observations regarding sample integrity or documentation. The laboratory project manager will also be responsible for ensuring that chain-of-custody forms and internal tracking records are completed upon receipt of the samples and maintained through all stages of laboratory analysis. Storage information will be maintained until disposal of the samples.

4.2.2.2 Chemical Analyses

Sediment samples will be analyzed for total solids, grain size, TOC, total PCB Aroclors as indicated. The methods of analysis are indicated in Table 5. All QA/QC procedures specified in each method will be followed and control limits will be met or corrective action will be taken as described in the methods.

Target method reporting limits for chemical analyses are provided in Table 2. The actual reporting limits attained during this site investigation may be elevated with respect to target reporting limits if interferences are encountered from the sample matrices. Sample cleanup procedures will be used as necessary to minimize interferences and optimize detection limits.

4.2.3 Quality Control

Quality control samples and procedures are used to obtain quantitative information regarding the execution of laboratory testing activities. Field quality control samples are not planned for this sampling effort.

4.2.3.1 Laboratory Quality Control Samples and Procedures

Each analytical protocol used in this site investigation (Table 5) includes specific instructions for analysis of quality control samples and completion of quality control procedures during sample analysis. These quality control samples and procedures verify that the instrument is calibrated properly and remains in calibration throughout the analytical sequence and that the sample preparation procedures have been effective and have not introduced contaminants into the samples. Additional quality control samples are used to identify and quantify positive or negative interference caused by the sample matrix. Each method protocol provides control

limits that indicate acceptable conditions for analysis of samples as well as unacceptable conditions that would necessitate reanalysis of samples.

The following laboratory quality control procedures are required for most of the protocols for chemical analyses:

- Calibration and calibration verification
- Method blanks
- Laboratory control samples
- Matrix spike samples and matrix spike duplicates
- Laboratory duplicates
- Surrogate spike compounds

4.2.4 Data Management

Computerized systems will be used to record, store, and sort the technical data that will be generated to support the sediment study. Automated procedures will be used by the laboratory to capture and summarize analytical results. Electronic data files will be imported directly from the laboratory to the project database, minimizing both data entry effort and opportunities for error. Sampling location coordinates will be entered into the database to enable computer generation of maps and figures.

Field logbooks, station/sample forms, and chain-of-custody forms will be prepared by the field team while sample collection activities are in progress. Sample information from the field will be entered manually into the database. Each data record will include a unique sample code, station ID, sample type (matrix), analyte, analyte concentration, and concentration units. Electronic data summaries will be produced to support data validation procedures. Data qualifiers will be entered into the database when validation is completed and verified, and the dataset is approved as final. All manual and electronic entries will be verified by the data manager or validation personnel.

Project data tables and reports will be prepared using customized retrievals that filter and sort the data according to criteria specified by the user. The data are automatically formatted for direct use with statistics software packages and various types of geographic information system software. The maintenance of a single, authoritative

database prevents the proliferation of multiple versions of data and the introduction and propagation of errors. Data will be provided to Ecology in a format compatible with its Environmental Information Management System, consistent with data templates received by Ecology at the outset of this project.

4.3 Data Verification, Validation, and Usability

Data verification and validation are conducted to establish the quality and usability of the project data. Data verification is the process of determining whether samples have been collected and analyzed according to procedures prescribed in this study plan, pertinent field and laboratory SOPs, and laboratory method descriptions. Data validation is the process of evaluating the technical quality of the verified data with respect to the project quality objectives. Data validation and verification criteria and procedures are described below.

4.3.1 Verification and Validation of Field Information

All protocols related to sample collection, storage, shipping, and handling include requirements for quality assurance procedures and documentation of activities. Any deviations from specified procedures will be documented in detail in the field logbook. The field logs will be reviewed as they are completed and again after the sampling effort is complete. Any field conditions or activities that may have affected the quality of the data will be evaluated by the Project QA/QC Coordinator and the field team leaders.

4.3.2 Verification and Validation of Laboratory Data

Chemical data will be evaluated according to criteria specified in the functional guidelines for data validation (EPA 1999 and 2001). Data may be qualified as estimated or rejected if quality control samples and procedures do not meet control limits, as described in the functional guidelines.

Verification and validation of chemical data will be completed at the laboratory and by the data validator. The laboratory will be responsible for the review and verification of all bench sheets, manual entry and transcriptions of data, and any professional judgments made by a chemist (e.g., identification of an Aroclor) during sample preparation, analysis, and calculation and reporting of the final concentrations. The laboratory will also be responsible for the review of quality control results to determine

whether data are of usable quality or if reanalysis is required. Any nonconformance issues identified during the laboratory's quality assurance checks will be corrected and noted by the laboratory. Close contact will be maintained between the Project QA/QC Coordinator and the laboratory project manager so that any quality issues can be resolved in a timely manner. Any data quality deviations will be discussed in the laboratory case narrative, including the direction or magnitude of any bias to the data, if possible.

Data validation and verification will be completed by a data validator prior to finalization of the data and release of the data set for interpretation. Chemical data will be validated according to EPA Level 3 criteria (PSEP 1991). Level 3 validation includes evaluation of the results for quality control samples (i.e., surrogate recoveries, calibration and method blanks, matrix spikes and matrix spike duplicates, and LCSs) with respect to control limits. Initial and continuing calibration results, calculations, and transcriptions will not be checked on a routine basis. The laboratory is responsible for 100 percent verification of these results and procedures.

Data qualifiers will be applied to the results according to procedures described in the EPA Contract Laboratory Program national functional guidelines for data review (EPA 1999 and 2001), as applicable, with modifications made as appropriate to accommodate method-specific quality control requirements. For conventional analyses and for field quality control results, data qualifiers will be applied when the quality control results do not meet MQOs (Table 5). The project data will be released for interpretation only after validation has been completed and all qualifiers have been correctly entered into the database.

4.3.3 Reconciliation with User Requirements

The goal of data validation is to determine the quality of each data point and to identify data that do not meet the project MQOs and project quality objectives. Nonconforming data may be qualified as estimated or rejected as unusable during data validation if criteria for data quality are not met. Rejected data will not be used for any purpose. An explanation of the rejected data will be included in the data validation report.

Data qualified as estimated (J) will be used for evaluating water quality and will be appropriately qualified in the final project database. These data are less precise or less accurate than unqualified data. The data users, data validator, and Anchor project managers are responsible for assessing the effect of the inaccuracy or imprecision of the qualified data on statistical procedures and other data uses for the sediment study. The data quality report will include all available information regarding the direction or magnitude of bias or the degree of imprecision for qualified data to facilitate the assessment of data usability.